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- ¹ Friedrich Kohlrausch, *Gesammelte Abhandlungen*, Leipzig, 1911.
² Kraus, C. A., and Bray, W. C., *J. Amer. Chem. Soc., Easton, Pa.*, **35**, 1913, (1412).
³ Wegscheider, *Zs. physik. Chem., Leipzig*, **69**, 1909, (603).
⁴ Noyes, A. A., and Falk, K. G., *J. Amer. Chem. Soc., Easton, Pa.*, **34**, 1912, (461).
⁵ Washburn, E. W., and Bell, J. E., *Ibid.*, **35**, 1913, (177); Washburn, *Ibid.* **38**, 1916, (2431); Washburn and Parker, K., *Ibid* **39**, 1917, (235).
⁶ Weiland, H. J., *Urbana, Univ. Ill. Theses*, 1917.
⁷ Bates, S. J., personal communication to the writer. See Washburn's *Introduction to the Principles of Physical Chemistry*, New York, 1915, p. 216. Bates does not propose his function as a basis for selecting the value of Δ_0 . For this purpose he employs a method which, while based upon substantially the same character of assumptions as the one adopted by the writer and giving nearly the same results, does not seem so direct and simple in its application. See Bates, *J. Amer. Chem. Soc., Easton, Pa.*, **35**, 1913, (526).

ON THE GROWTH AND FECUNDITY OF ALCOHOLIZED RATS

By E. C. MacDowell and E. M. Vicari

STATION FOR EXPERIMENTAL EVOLUTION, COLD SPRING HARBOR, N. Y.

Communicated by C. B. Davenport, August 16, 1917

In the course of an experiment conducted primarily for a different purpose, we have obtained data upon the effect of large doses of inhaled alcohol on the growth and fecundity of a series of albino rats. From the time of weaning (28 days) the alcohol was administered daily. Except for the first few weeks when the doses were lighter, the rats were left in the inhalation tanks till they could no longer stand upon their feet and could move but very feebly, if at all. The purpose was to give as heavy a dose as possible without killing the animal. This took different times for different rats, and the time required on different days varied according to the intensity of the alcohol vapor in the tanks. No data were recorded as to the time required to regain normal activity, but it may be said in general that this was roughly a matter of three to four hours.

For each rat alcoholized, a normal control from the same litter and of the same sex was raised. These controls were kept in companion cages adjacent to their corresponding alcoholic sibs. Except for the alcohol treatment, all the rats were given the same care and attention.

Weekly weighings were made of all the rats and individual growth curves were plotted. From these curves the weights at the ages given in the standard growth curves of Donaldson were estimated. In making these estimations, allowances were made for temporary losses in weight due to food conditions or minor illnesses; in doing this the whole curve of the individual was considered as well as the curves of its sibs and the standard Wistar curves. The weights so obtained were averaged for the two groups of rats, and these averages plotted in figure 1.

The weights given for the first point (30 days) are mainly approximations, as the first weighings of many of the rats were not taken till after this time. For this reason the weights at 40 days have been given. It will be noted that the averages of both sets of rats for 90 days are a little low. This lowering is unquestionably the result of a reduced diet that was given to all the rats in connection with a series of behavior experiments.

The divergence shown between the two curves is sufficiently clear to make it impossible to question the conclusion that the alcoholics

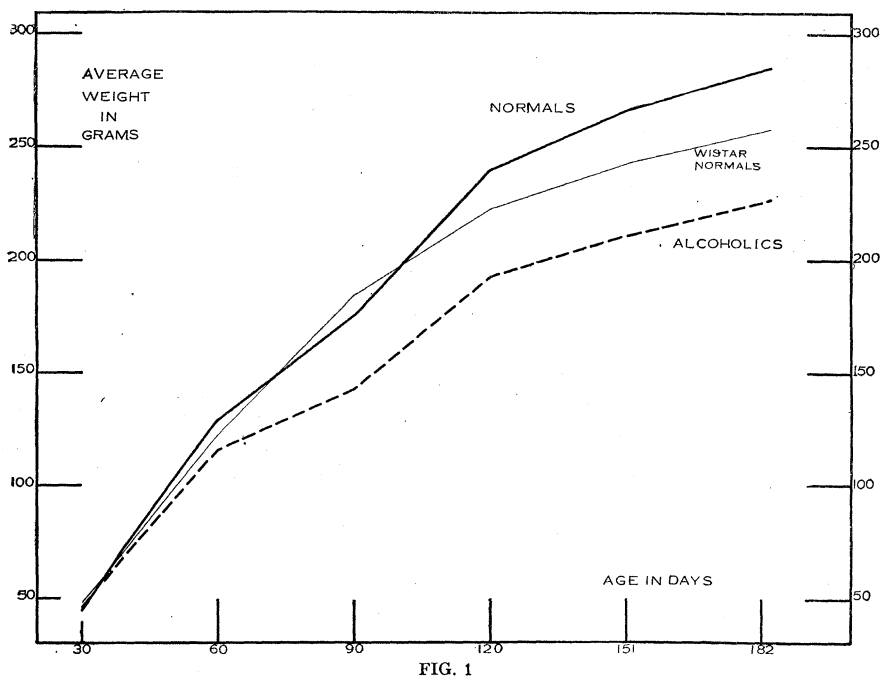


FIG. 1

have suffered a loss in weight as a result of the treatment with alcohol. The amount of this loss as shown in the curves is very close to 20% of the normal weight at 182 days. The light line in the figure was plotted from the averages given by H. H. Donaldson, *The Rat*, (Philadelphia, 1915), page 113, table 67. As all the rats here described were bred from the Wistar standard stock, the higher averages of these normals appear to indicate that the food and environmental conditions have been especially favorable. It follows from this that the lowering of the weights of the alcoholic rats is not partly due to unfavorable conditions.

In this report the males alone have been considered. As the corresponding females were used for breeding, the frequent pregnancies rendered it extremely difficult to estimate the normal weights at the specified ages. Moreover, the females are less satisfactory for this study since during the times they were nursing their young the alcohol treatment was suspended, although during pregnancy up to the time for the young to be born, they did receive the alcohol.

The reduction in the number of young born to alcoholic parents is even more striking than the loss in weight. The figures in table 2 show that, while 29 pairs of normal rats produced 300 young, 30 pairs of alcoholic rats produced in the same time 108 young. The summaries for the four lines all show a similar decrease in fecundity of the alcoholics as compared with the normals as is shown in the grand total.

The discussion and a more critical analysis of these results will be reserved for an extended account at a later date.

TABLE 1

AVERAGE WEIGHTS (IN GRAMS) OF ALCOHOLIZED MALE RATS COMPARED WITH THEIR NORMAL BROTHERS

AGE IN DAYS	ALCOHOLICS		NORMALS		DIFFERENCES IN BODY WEIGHT
	Number of individuals	Average body weight	Number of individuals	Average body weight	
		<i>grams</i>		<i>grams</i>	
30	27	46.2	22	45.4	0.8
40	27	70.5	22	74.5	4.0
60	27	116.1	22	128.7	12.6
90	26	142.3	22	174.9	32.6
120	22	192.5	21	239.8	47.3
151	16	211.7	18	267.0	55.3
182	10	227.1	13	285.0	57.9

TABLE 2

FECUNDITY RECORDS OF ALCOHOLIC RATS COMPARED WITH NORMAL RATS; MATINGS OF ALCOHOLICS AND THE CORRESPONDING NORMALS MADE ON THE SAME DAY, AND THE RECORD OF BIRTHS TAKEN DURING EQUAL PERIODS

GROUP	NUMBER OF PAIRS		NUMBER OF YOUNG BORN	
	Alcoholics	Normals	Alcoholics	Normals
A.....	10	10	23	75
B.....	4	3	13	31
C.....	7	8	30	81
KC.....	9	8	42	113
Total.....	30	29	108	300